Introduction

Key to the evaluation of the route concepts is the development of objective performance measures. These performance measures serve as "yardsticks" for assessing the degree to which an alternative achieves an intended goal. They also permit an objective method for comparing the relative performance of the alternatives.

The performance measures for this project are documented in the Purpose and Need Statement. Each performance measure relates to a specific need and associated goal.

Each performance measure is grouped into one of ten "families" of similar factors and each family relates to a specific need and goal/policy for I-69. This Appendix, Appendix A, gives detailed information about the four families of Transportation Performance Indicators.

Since most of the factors measure different transportation or economic variables, they are often quantified in different units of measurement. For example, proximity measures are tabulations of the population within a specified number of minutes from a city or some other important destination(s). In this case, the unit of measurement is people. On the other hand, safety data are measured by the number of vehicular crashes and business cost savings is measured in dollars. In some cases more is better; in some cases, less is better. For example, a route concept that provides a shorter travel time between Evansville and Indianapolis is better (at least on that performance measure) than one with a longer travel time. By contrast, a route concept that can be expected to stimulate more jobs is better than one that would stimulate fewer.

In order to simplify the analysis and reduce potential sources of confusion, all performance measures have been converted from their original unit of measure to a value that has been scaled between 0 and 100. Moreover, all performance measures in which less is better have been inverted and scaled on the same 0 – 100 yardstick. In other words, the alternative with the poorest score is always indexed to 0 and the alternative with the best score is always indexed to 100. The adoption of this scoring practice allows for simple comparisons between totally different types of measures. It also provides more information than simply ranking the alternatives.

Another analytical practice has been to compute an *average composite score* for each *family* of performance measures. This practice has simplified the analytical process; now, we only have to look at 10 sets of scores rather than 40. Moreover, this practice has reduced the possibility that performance measures that tend to measure the same thing are double-counted.

Chapter 3 of the Environmental Impact Statement contains the average composite scores for each family. Appendices A - C give the raw values of the individual performance measures, along with their respective scaled scores.

Transportation Performance Measures

1. Connection between Evansville and Indianapolis

Evansville ranks last or near to last among major urban centers in Indiana in terms of its highway connection to Indianapolis. It is a ***core goal*** of this project to improve the linkage between Evansville and Indianapolis.

The performance measures which were used to evaluate the effectiveness of alternative route concepts at improving the connection between Evansville and Indianapolis are travel times between I-64 (at either US 41 or I-164) and I-465. Both free flow and average or typical travel times (which take into account average traffic delays over a 24 hour period) were used in the analysis. Table A1 summarizes the typical congested travel time and time savings associated with each alternative.

Table A1 - Travel Times and Travel Time Savings, by Route Concept

Alternatives	Travel Times (Minutes)		Time Savings (Minutes)	
	Free Flow	Typical Condition	Free Flow	Congested
NB	164	171	--	--
Alt A	153	159	11	12
Alt B1	149	155	14	17
Alt B2	151	157	12	15
Alt C1	145	151	18	20
Alt C2	148	153	16	19
Alt D	162	169	2	3
Alt E	152	158	11	14
Alt F1	139	141	24	30
Alt F2	141	143	23	28
Alt G	147	149	17	23
Alt H1	143	145	21	27
Alt H2	144	147	19	25
Alt I	144	146	19	25
Alt J	143	145	21	27
Alt K	152	155	11	17
Alt L1	149	151	15	20
Alt L2	151	153	13	18
Alt M	158	160	5	11
Alt N	162	165	2	7

Source: Bernardin, Lochmueller & Associates, Inc., September 2001. Travel times assume no stops except at traffic signals and (for "Typical Condition") typical congestion levels over a 24-hour period. Congestion levels are based on forecasted traffic volumes for 2025. "NB" denotes the "No Build" Alternative.

Since there is a linear relationship between travel time and travel time savings, computing scaled scores for *travel times* and *travel time savings* produce identical results. Accordingly, rankings and composite scores were computed using only the travel time results. Tables A2, A3, and A4 give the scaled free flow times, typical travel times, and average scaled times for each alternative, including the no build. Figures A2, A3, and A4 depict the scores from their corresponding tables. Note, that in order to maintain a consistent designation between the Tables and Figures, there is no Figure A1.

Table A2 - Scaled Free Flow Travel Times, by Route Concept

Alternative	Scaled Free Flow Travel Time between Evansville & Indianapolis	FF Travel Times	Ranking
NB	0.00	164	20
A	44.00	153	16
B1	60.00	149	10
B2	52.00	151	12
C1	76.00	145	7
C2	64.00	148	9
D	8.00	162	18
E	48.00	152	14
F1	100.00	139	1
F2	92.00	141	2
G	68.00	147	8
H1	84.00	143	3
H2	80.00	144	5
I	80.00	144	5
J	84.00	143	3
K	48.00	152	14
L1	60.00	149	10
L2	52.00	151	12
M	24.00	158	17
N	8.00	162	18

Figure A2 - Evansville-Indianapolis Connection Free Flow Travel Time Scores

Route Concepts

Note: Differences between routs are exaggerated to permit comparisons between performance measures. Scaled values do _not_ equal perccentages.
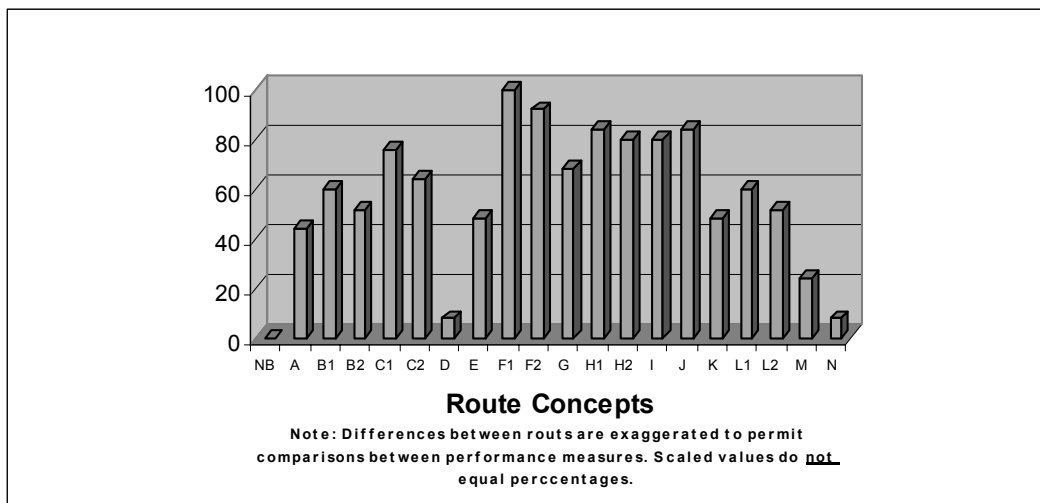
Table A3 - Scaled Typical Travel Times, by Route Concept

Alternative	Scaled Average Daily Travel Time between Evansville & Indianapolis	Avg Travel Times	Ranking
NB	0.00	171	20
A	40.00	159	16
B1	53.33	155	12
B2	46.67	157	14
C1	66.67	151	8
C2	60.00	153	10
D	6.67	169	19
E	43.33	158	15
F1	100.00	141	1
F2	93.33	143	2
G	73.33	149	7
H1	86.67	145	3
H2	80.00	147	6
I	83.33	146	5
J	86.67	145	3
K	53.33	155	12
L1	66.67	151	8
L2	60.00	153	10
M	36.67	160	17
N	20.00	165	18

Figure A3 - Evansville-Indianapolis Connection Typical Travel Time Scores

Note: Differences between routes are exaggerated to permit comparisons between performance measures. Scaled values do not equal percentages.
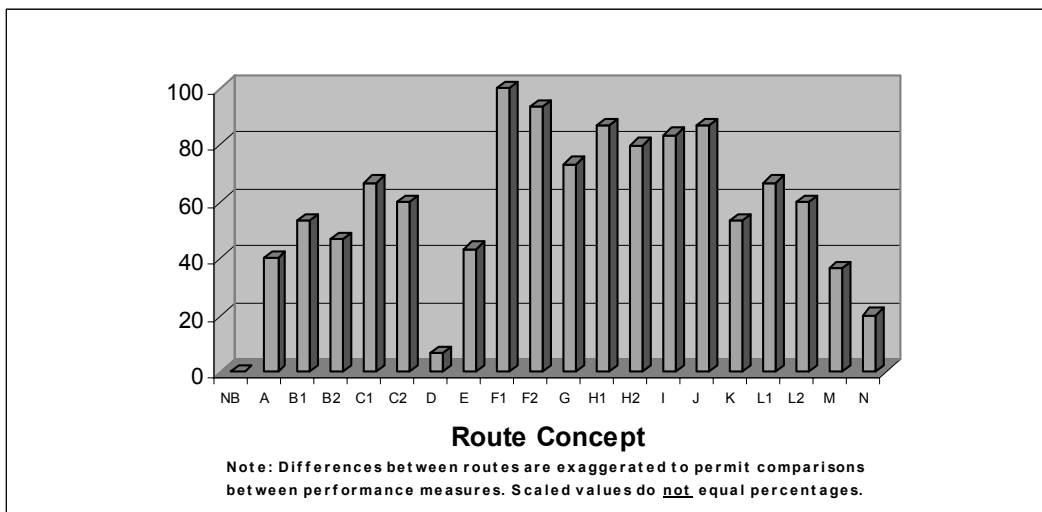
Table A4 - Average Scaled Travel Time Scores

Alternative	Average Scaled Travel Time Score	Ranking
NB	0.00	20
A	42.00	16
B1	56.67	11
B2	49.33	14
C1	71.33	7
C2	62.00	10
D	7.33	19
E	45.67	15
F1	100.00	1
F2	92.67	2
G	70.67	8
H1	85.33	3
H2	80.00	6
I	81.67	5
J	85.33	3
K	50.67	13
L1	63.33	9
L2	56.00	12
M	30.33	17
N	14.00	18
Scores are averages from Tables A2 and A3		

Figure A4 - Evansville-Indianapolis Connection Composite Travel Time Scores

Note: Differences between routes are exagerrated to permit comparisons between performance measures. Scaled values do <u>not</u> equal percentages.
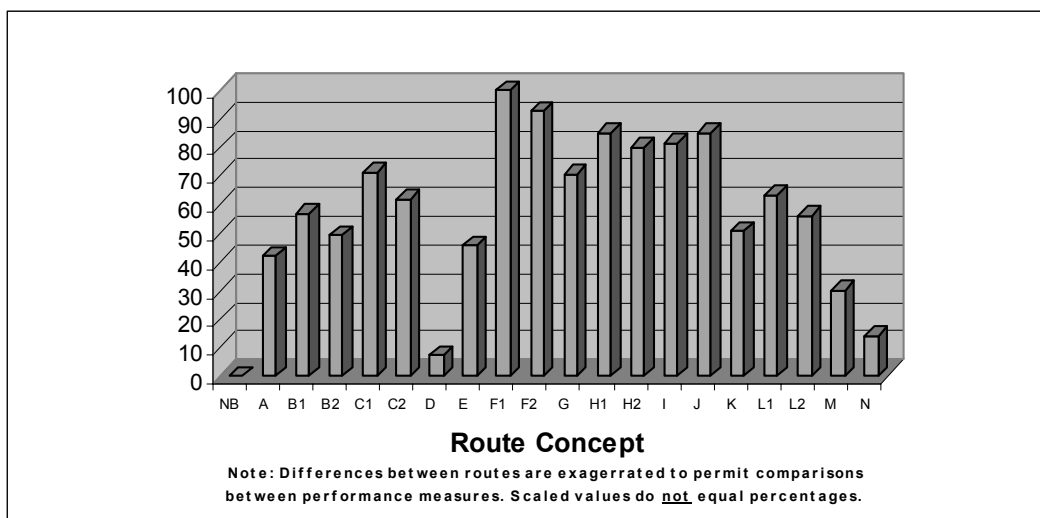
2. Personal Accessibility

The second ***core goal*** of I-69 in Indiana is to improve accessibility for the residents of Southwestern Indiana. The Purpose and Need Statement established that Southwestern Indiana has poorer access to population centers, jobs, major airports and other centers of activity than most of the rest of the State. It also presented evidence to document that this lack of accessibility is not solely a function of geographic remoteness.

The family of performance measures used to evaluate the improvement in regional accessibility is comprised of three sub-families of measures. These sub-families are (1) accessibility indices, (2) proximity tabulations, and (3) the percentage of total forecasted vehicle-miles of travel on major highways (i.e., Interstates and other principal arterials).

An ***Accessibility Index*** is a mathematical measure of access based on the size of the population (or employment or airplane departures, etc.) at various destinations and the highway travel time to those destinations. All things being equal, as travel times are reduced (either from faster speeds on existing facilities or the construction of a new road), the accessibility index becomes a larger number.

Accessibility indices computed by the statewide transportation model were used in the Purpose and Need Statement to demonstrate that Southwestern Indiana is disadvantaged in terms of regional accessibility. Accordingly, several of these same indices have been used to measure the improvement in accessibility of the proposed route concepts. These are: an accessibility-to-population index, an accessibility-to-employment index, and a population-weighted accessibility-to-employment index.

Population Proximity Tabulations are the sum of total population within a specified highway travel time of an important destination. The proximity tabulations used in this analysis are: (1) the population within 1, 2, and 3 hours of Indianapolis; (2) the population within 1 hour of major educational institutions in the I-69 Study Area, and; (3) the population within a half-hour of urbanized areas located in the I-69 Study Area (i.e., Indianapolis, Terre Haute, Bloomington, and Evansville). The educational institutions used in this analysis are Indiana University, Indiana State University, the University of Evansville, and the University of Southern Indiana.

Percentage of Vehicle-Miles on Highways is another way of measuring accessibility. The percentage of total vehicle-miles in the transportation system which make use of high-capacity highways (Interstate and other principal arterials) measures the accessibility provided by the transportation system. The higher the percentage of total travel using these highways, the greater the accessibility provided by the highway system.

In order to compute overall performance for the accessibility measure, the performance of each alternative was scored for each measure within a subcategory. For example, in the subcategory of Accessibility Indices, the performance of each alternative was scored for each index. Then, the three indices in this subcategory were averaged and normalized to 100 to arrive at an average scoring in that subcategory. Then, the average scores in each subcategory were averaged and normalized to 100 to arrive at an overall scoring for the category of personal accessibility.
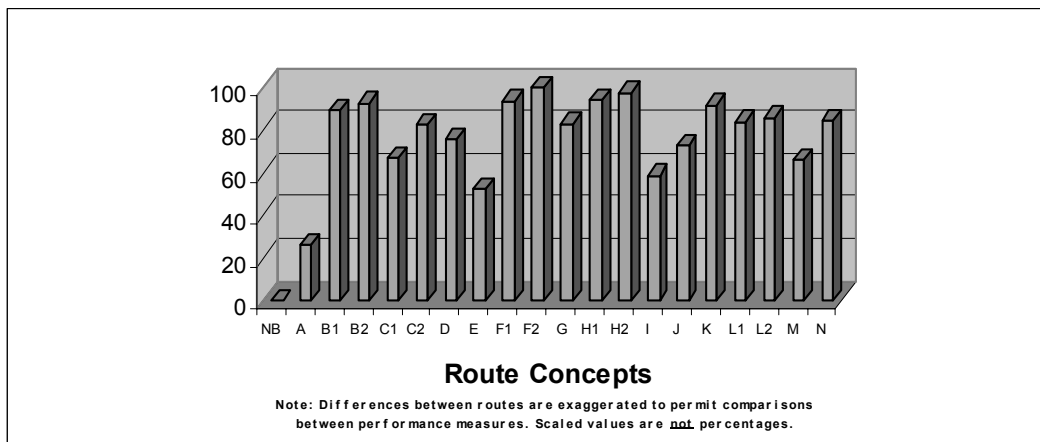
A.   Accessibility Indices

Accessibility indices were calculated for the No Build Alternative, as well as each route concept. These calculations were made using the Indiana Statewide Travel Model, as described in *Task Report 3.3.4, Regional Transportation Needs Analysis.* Tables and Figures A5 through A7 show the raw numbers and scaled results of the accessibility indices calculated for each alternative. Table and Figure A8 give the composite (average) scaled accessibility performance scores.

**Table A5 - Population Accessibility Calculations and
Scaled Population Accessibility Indices**

Alternative	Scaled Population Accessibility Index	Population Accessibility	Ranking
NB	0.00	422,825,051	20
A	26.16	423,841,868	19
B1	89.44	426,302,116	7
B2	92.95	426,438,369	5
C1	66.90	425,425,824	15
C2	82.61	426,036,691	12
D	75.51	425,760,522	13
E	52.63	424,870,977	18
F1	93.50	426,459,808	4
F2	100.00	426,712,638	1
G	83.24	426,061,228	11
H1	94.33	426,492,189	3
H2	97.45	426,613,685	2
I	58.62	425,104,127	17
J	72.65	425,649,232	14
K	91.85	426,395,607	6
L1	83.69	426,078,726	10
L2	86.00	426,168,493	8
M	65.91	425,387,469	16
N	84.29	426,101,929	9

Figure A5 - Population Accessibility Scores

Note: Differences between routes are exaggerated to permit comparisons between performance measures. Scaled values are not percentages.

**Table A6 - Employment Accessibility Calculations and
Scaled Employment Accessibility Indices**

Alternative	Scaled Employment Accessibility Index	Employment Accessibility	Ranking
NB	0.00	296,281,919	20
A	25.61	296,990,736	19
B1	89.23	298,751,257	6
B2	92.90	298,852,867	5
C1	66.53	298,123,114	15
C2	82.04	298,552,307	12
D	75.42	298,369,211	13
E	52.55	297,736,355	18
F1	93.63	298,873,148	4
F2	100.00	299,049,429	1
G	83.60	298,595,578	10
H1	94.17	298,888,005	3
H2	96.94	298,964,688	2
I	57.44	297,871,620	17
J	71.56	298,262,406	14
K	87.72	298,709,542	7
L1	83.53	298,593,689	11
L2	85.97	298,661,084	8
M	65.09	298,083,169	16
N	83.65	298,597,050	9

Figure A6 - Employment Accessibility Scores

Note: Differences between routes are exaggerated to permit comparisons between performance measures. Scaled values do **not** equal percentages.
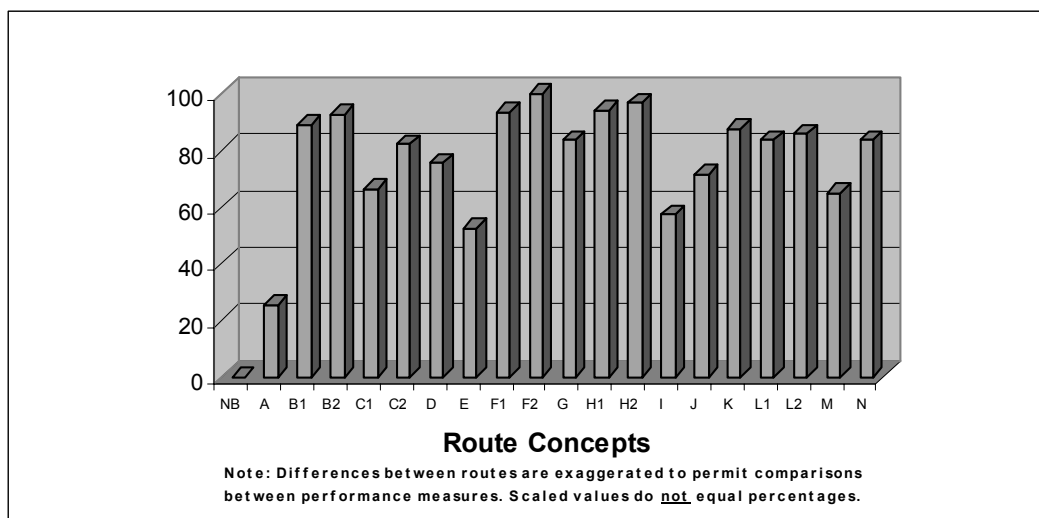
**Table A7 - Population-Weighted Employment Accessibility Calculations and
Scaled Population-Weighted Employment Accessibility Indices**

Alternative	Scaled Population-Weighted Employment Accessibility Index	Pop Wgt Employment Accessibility	Ranking
NB	0.00	3,281,060,154,018	20
A	23.58	3,286,349,500,360	19
B1	85.23	3,300,175,857,858	9
B2	93.73	3,302,080,805,084	4
C1	62.71	3,295,123,969,467	15
C2	82.42	3,299,545,638,912	11
D	80.49	3,299,112,343,238	12
E	42.17	3,290,517,680,812	18
F1	87.94	3,300,782,583,286	7
F2	100.00	3,303,487,856,808	1
G	75.63	3,298,022,148,995	13
H1	93.06	3,301,931,135,880	5
H2	99.72	3,303,424,988,543	2
I	50.39	3,292,362,059,310	17
J	64.95	3,295,627,050,452	14
K	98.33	3,303,112,708,431	3
L1	84.33	3,299,973,923,879	10
L2	90.66	3,301,392,637,549	6
M	50.42	3,292,368,588,306	16
N	86.65	3,300,494,618,579	8

Figure A7 - Population-Weighted Accessibility to Employment Scores

Note: Differences between routes are exaggerated to permit comparisons between performance measures. Scaled values do **not** equal percentages.
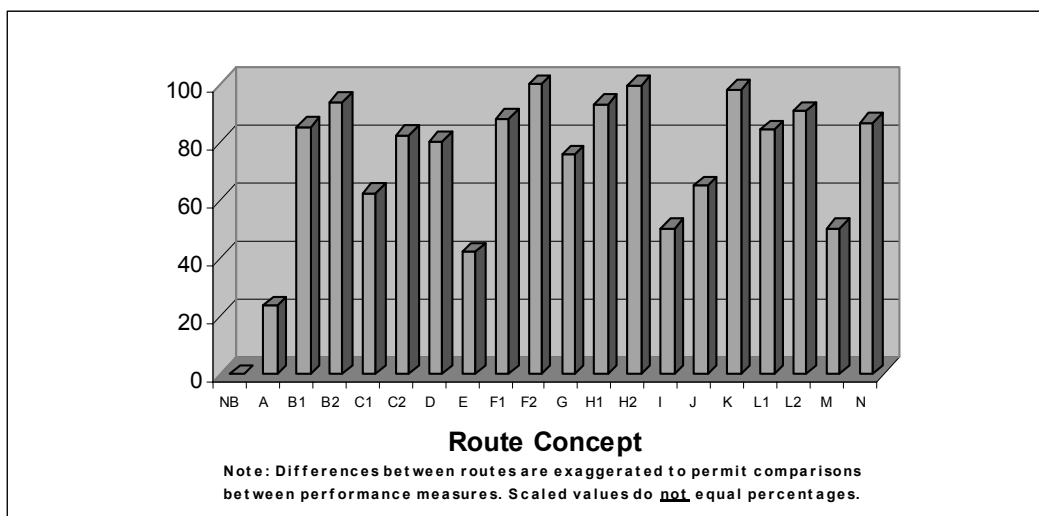
Table A8 - Scaled Composite Accessibility Index

Alternative	Scaled Composite Accessibility Index	Ranking
NB	0.00	20
A	25.12	19
B1	87.97	7
B2	93.19	4
C1	65.38	15
C2	82.36	11
D	77.14	13
E	49.12	18
F1	91.69	6
F2	100.00	1
G	80.82	12
H1	93.85	3
H2	98.04	2
I	55.49	17
J	69.72	14
K	92.63	5
L1	83.85	10
L2	87.54	8
M	60.47	16
N	84.87	9

Figure A8 - Scaled Composite Accessibility Scores

Route Concepts

Note: Differences between routes are exaggerated to permit comparison between performance measures. Scaled values do not equal percentages.
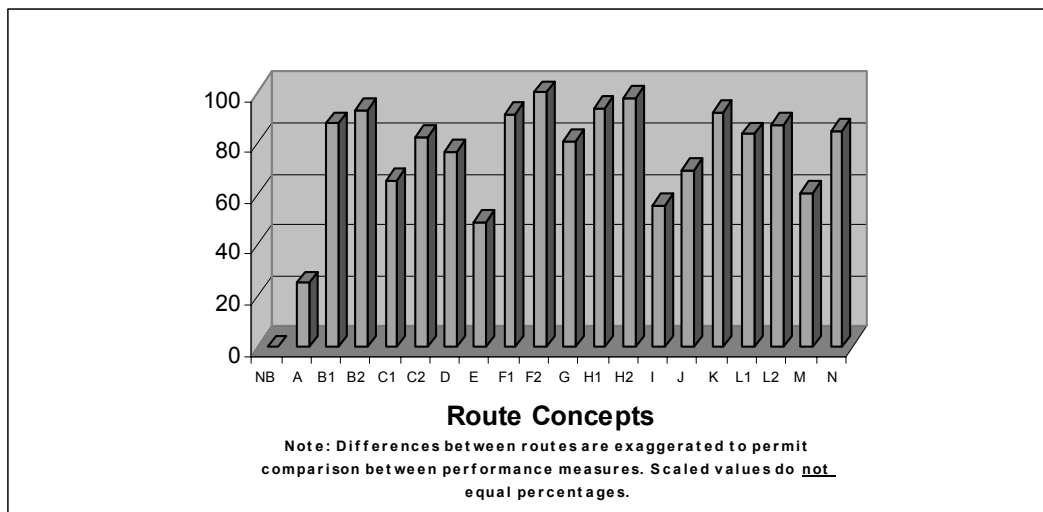
B. Population Proximity Tabulations

Population proximity tabulations count the number of people living within a given highway travel time of an important destination. Calculations were made by the Indiana Statewide Travel Model, using population and highway free flow travel times for 2025. Tables and Figures A9 through A11 show proximity indices and scaled results calculated for each alternative. Table and Figure A12 give the composite (average) scaled proximity performance scores.

Table A9 gives the number of people within one, two, and three hours of Indianapolis, as well as their scaled scores. Figure A9 graphs the three hour scaled scores.

Table A9 - Population within 1, 2, and 3 hours of Indianapolis

| Alternative | Scaled Proximity Scores | | | People Within Given Time of Indianapolis | | | | | |
| | | | | 1 Hour | | 2 Hour | | 3 Hour | |
	1 hour	2 hour	3 hour	Number	Rank	Number	Rank	Number	Rank
NB	-	-	-	2,310,440	18	7,798,772	20	15,470,354	20
A	-	28.72	25.22	2,310,440	18	7,816,408	19	15,528,747	18
B1	100.00	68.83	53.03	2,370,098	1	7,841,039	4	15,593,132	9
B2	100.00	65.67	53.03	2,370,098	1	7,839,095	7	15,593,132	9
C1	13.47	54.21	43.03	2,318,474	15	7,832,059	11	15,569,992	14
C2	61.80	68.51	36.49	2,347,310	11	7,840,841	6	15,554,853	15
D	100.00	56.70	12.13	2,370,098	1	7,833,590	10	15,498,436	19
E	13.47	46.48	29.48	2,318,474	15	7,827,314	14	15,538,607	16
F1	42.07	100.00	100.00	2,335,537	12	7,860,178	1	15,701,894	1
F2	76.94	75.11	93.46	2,356,339	10	7,844,891	3	15,686,755	2
G	42.07	100.00	86.45	2,335,537	12	7,860,178	1	15,670,509	3
H1	100.00	68.83	71.72	2,370,098	1	7,841,039	4	15,636,425	4
H2	100.00	65.67	71.72	2,370,098	1	7,839,095	7	15,636,425	4
I	-	51.90	48.18	2,310,440	18	7,830,641	12	15,581,900	12
J	13.47	51.90	48.18	2,318,474	15	7,830,641	12	15,581,900	12
K	14.31	29.71	29.48	2,318,977	14	7,817,016	18	15,538,607	16
L1	100.00	38.79	64.71	2,370,098	1	7,822,592	15	15,620,179	6
L2	100.00	38.79	53.03	2,370,098	1	7,822,592	15	15,593,132	9
M	100.00	38.79	64.71	2,370,098	1	7,822,592	15	15,620,179	6
N	100.00	61.42	62.28	2,370,098	1	7,836,489	9	15,614,564	8

Figure A9 - Scaled Scores, 3 hour Access to Indianapolis

Route Concept

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route scaled from 0-100. NB is No-Build.
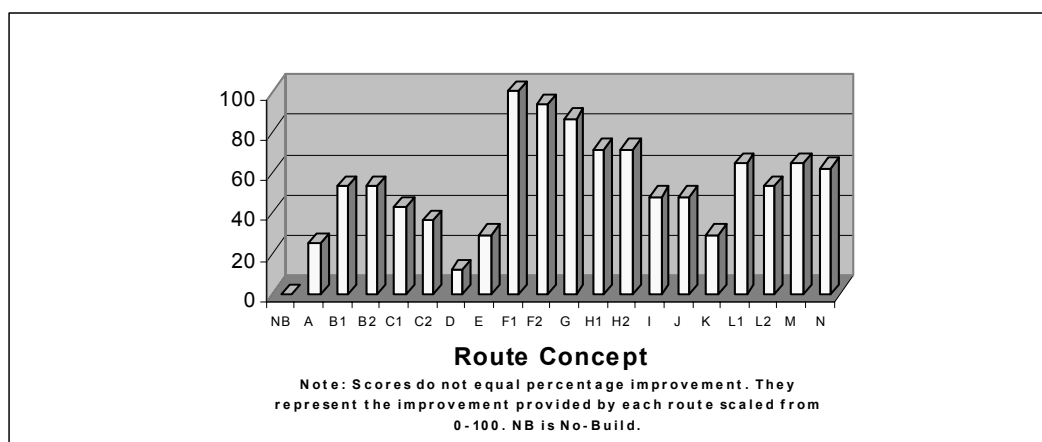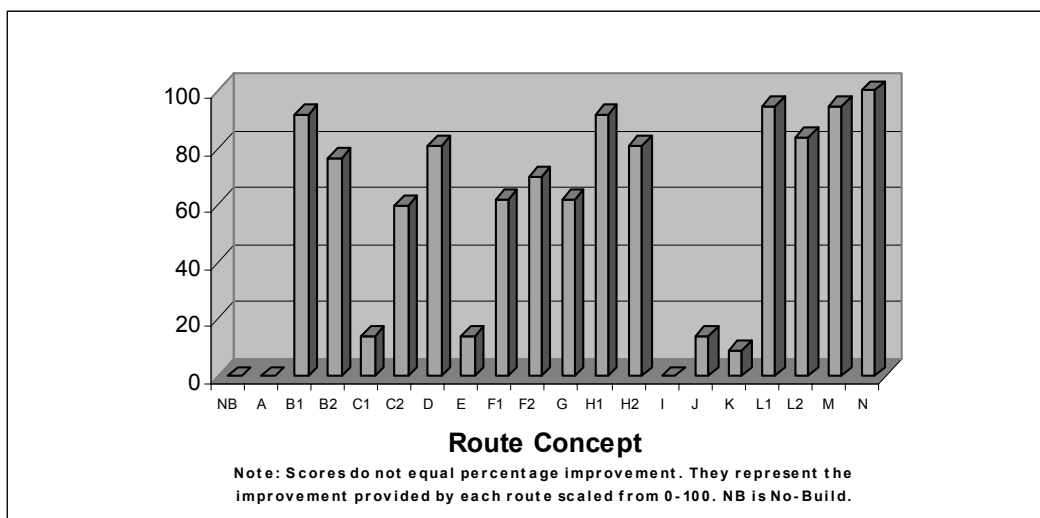
Table A10 - Population Within 1 Hour of Major Educational Institution (Indiana University, Indiana State University, University of Evansville, or Southern Indiana University)

Alternative	Scaled Proximity Scores	People Within 1 Hour	Ranking
NB	0.00	1,876,724	18
A	0.00	1,876,724	18
B1	91.85	2,251,223	4
B2	76.24	2,187,591	9
C1	14.21	1,934,653	14
C2	59.57	2,119,598	13
D	80.77	2,206,033	7
E	14.21	1,934,653	14
F1	61.92	2,129,182	11
F2	70.25	2,163,141	10
G	61.92	2,129,182	11
H1	91.85	2,251,223	4
H2	80.77	2,206,033	7
I	0.00	1,876,724	18
J	14.21	1,934,653	14
K	9.01	1,913,466	17
L1	94.73	2,262,962	2
L2	83.65	2,217,772	6
M	94.73	2,262,962	2
N	100.00	2,284,454	1

Figure A10 - Scaled Proximity to Educational Institutions Scores

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route scaled from 0-100. NB is No-Build.

**Table A11 - Population Within 30 Minutes of Urbanized Area
(Indianapolis, Terre Haute, Bloomington, or Evansville)**

Alternative	Scaled Proximity Scores	Population Within 30 Minutes	Ranking
NB	0.00	1,893,271	18
A	20.92	1,901,808	12
B1	78.78	1,925,418	5
B2	78.78	1,925,418	5
C1	10.23	1,897,446	16
C2	31.45	1,906,103	10
D	100.00	1,934,075	1
E	10.23	1,897,446	16
F1	12.07	1,898,197	13
F2	12.07	1,898,197	13
G	12.07	1,898,197	13
H1	68.55	1,921,243	7
H2	89.77	1,929,900	3
I	0.00	1,893,271	18
J	0.00	1,893,271	18
K	26.44	1,904,059	11
L1	68.55	1,921,243	7
L2	89.77	1,929,900	3
M	68.55	1,921,243	7
N	94.87	1,931,983	2

Figure A11 - Proximity to Urban Areas Scaled Scores

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route scaled from 0-100. NB is No-Build.
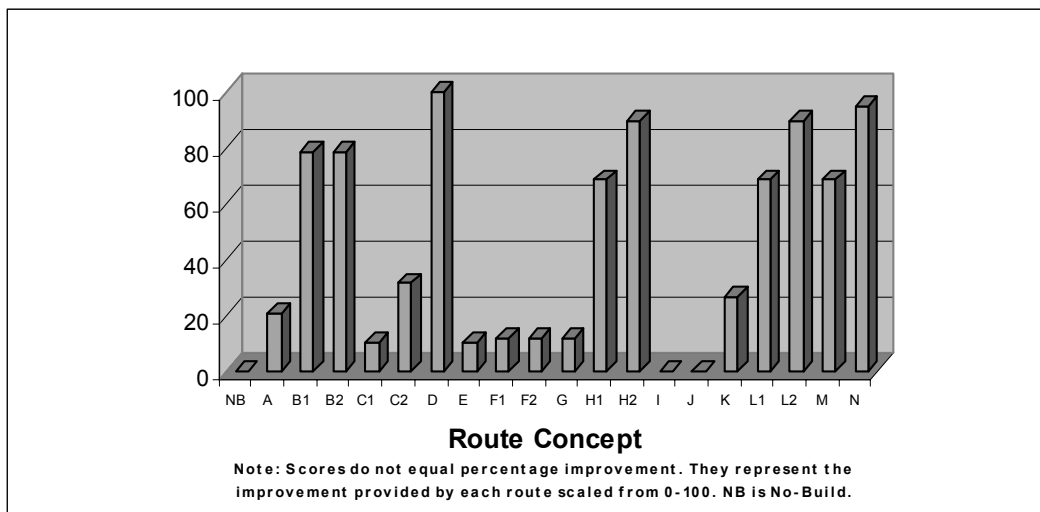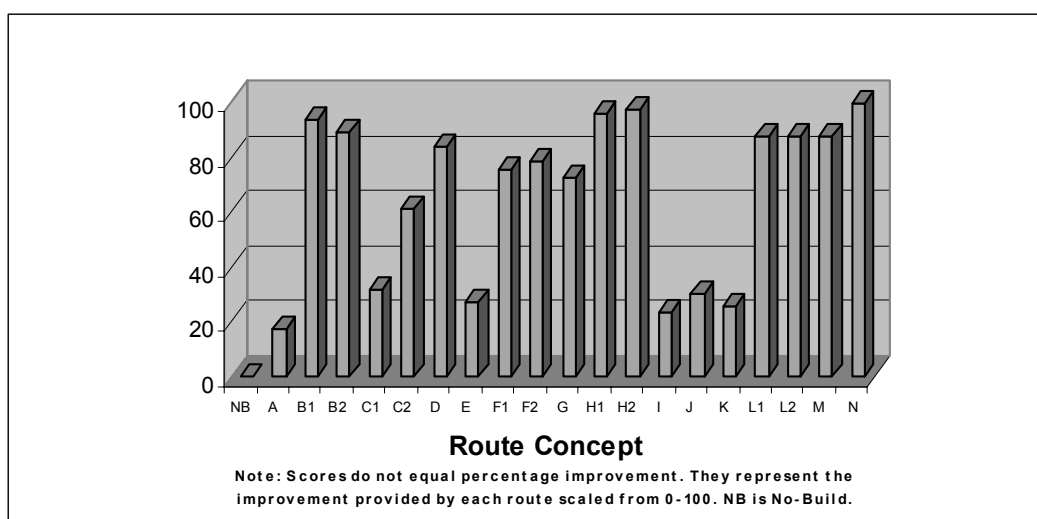
To compute composite proximity scores, the values of all five proximity measures were averaged. Table and Figure A12 show the values of these averaged proximity scores.

Table A12 - Average Proximity Scores, by Alternative

Alternative	Proximity Indices					Composite Score	Rank
	Educational	Urbanized	1-Hr Indy	2-Hrs Indy	3-Hrs Indy		
NB	0.00	0.00	0.00	0.00	0.00	0.00	20
A	0.00	20.92	0.00	28.72	25.22	17.88	19
B1	91.85	78.78	100.00	68.83	53.03	93.77	4
B2	76.24	78.78	100.00	65.67	53.03	89.28	5
C1	14.21	10.23	13.47	54.21	43.03	32.29	14
C2	59.57	31.45	61.80	68.51	36.49	61.59	13
D	80.77	100.00	100.00	56.70	12.13	83.52	9
E	14.21	10.23	13.47	46.48	29.48	27.20	16
F1	61.92	12.07	42.07	100.00	100.00	75.51	11
F2	70.25	12.07	76.94	75.11	93.46	78.32	10
G	61.92	12.07	42.07	100.00	86.45	72.27	12
H1	91.85	68.55	100.00	68.83	71.72	95.79	3
H2	80.77	89.77	100.00	65.67	71.72	97.45	2
I	0.00	0.00	0.00	51.90	48.18	23.91	18
J	14.21	0.00	13.47	51.90	48.18	30.52	15
K	9.01	26.44	14.31	29.71	29.48	26.03	17
L1	94.73	68.55	100.00	38.79	64.71	87.63	6
L2	83.65	89.77	100.00	38.79	53.03	87.26	8
M	94.73	68.55	100.00	38.79	64.71	87.63	6
N	100.00	94.87	100.00	61.42	62.28	100.00	1

Figure A12 - Scaled Average Proximity Scores, by Alternative

Route Concept

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route scaled from 0-100. NB is No-Build.
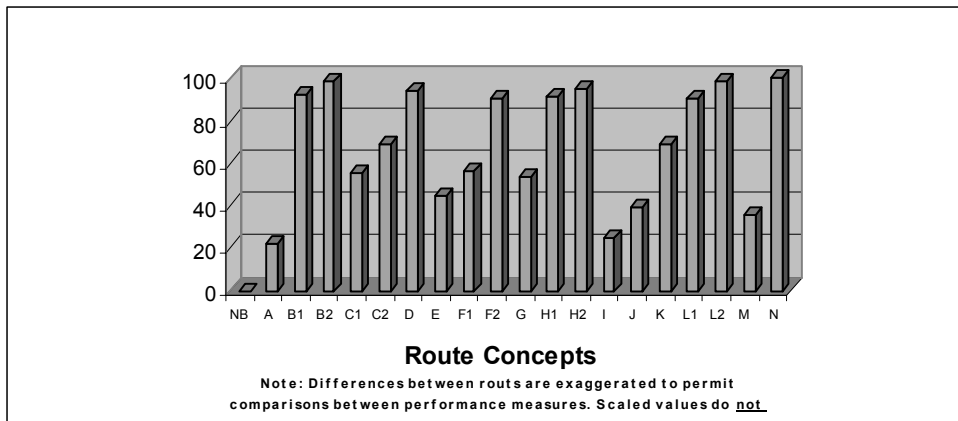
C. Percentage of Vehicle Miles on Highways

One measure of accessibility is the percentage of travel on the transportation system which occurs on high-capacity highways. For this measure, the percentages of vehicle hours of travel (VHT) and vehicle miles of travel (VMT) on Interstate and other principal arterials were computed. The travel estimates were taken from model assignments for each alternative using the Indiana Statewide Travel Model. The higher the percentage of total traffic using these major highways, the greater the accessibility provided by the system.

Tables and Figures A13 through A15 show percentages and rankings of travel on major highways, by alternative. All figures are for Year 2025 forecasted travel within the 26-county study area, only.

Table A13 - Percentages of Vehicle Miles of Travel (VMT) on Major Highways in Study Area

Alternative	Scaled Percentage, VMT on Highways	% VMT on Highways	Ranking
NB	0.00	60.48%	20
A	21.89	61.44%	19
B1	92.62	64.55%	6
B2	99.06	64.84%	2
C1	55.25	62.91%	13
C2	68.69	63.50%	10
D	94.56	64.64%	5
E	44.20	62.42%	15
F1	56.55	62.97%	12
F2	90.48	64.46%	9
G	53.75	62.84%	14
H1	91.03	64.48%	7
H2	95.07	64.66%	4
I	25.09	61.58%	18
J	38.98	62.19%	16
K	68.64	63.50%	11
L1	90.92	64.48%	8
L2	98.64	64.82%	3
M	35.66	62.05%	17
N	100.00	64.88%	1

**Figure A13 - Scaled Percentages of Vehicle Miles of Travel (VMT)
on Major Highways in Study Area**

Route Concepts

Note: Differences between routs are exaggerated to permit
comparisons between performance measures. Scaled values do **not**

**Table A14 - Percentages of Vehicle Hours of Travel (VHT)
on Major Highways in Study Area**

Alternative	Scaled % VHT on Highways	% VHT on Highways	Ranking
NB	0.00	47.49%	20
A	25.13	47.93%	16
B1	92.57	49.13%	5
B2	95.10	49.17%	3
C1	66.00	48.66%	11
C2	100.00	49.26%	1
D	90.49	49.09%	7
E	11.65	47.70%	19
F1	58.36	48.52%	13
F2	92.54	49.13%	6
G	59.75	48.55%	12
H1	93.49	49.14%	4
H2	95.78	49.19%	2
I	24.08	47.92%	18
J	48.29	48.34%	14
K	43.09	48.25%	15
L1	89.47	49.07%	8
L2	86.39	49.02%	9
M	24.88	47.93%	17
N	85.85	49.01%	10

**Figure A14 - Scaled Percentages of Vehicle Hours of Travel (VHT)
on Major Highways in Study Area**

Route Concept

Note: Differences between routes are exaggerated to permit comparisons
between performance measures. Scaled values do <u>not</u> equal percentages.
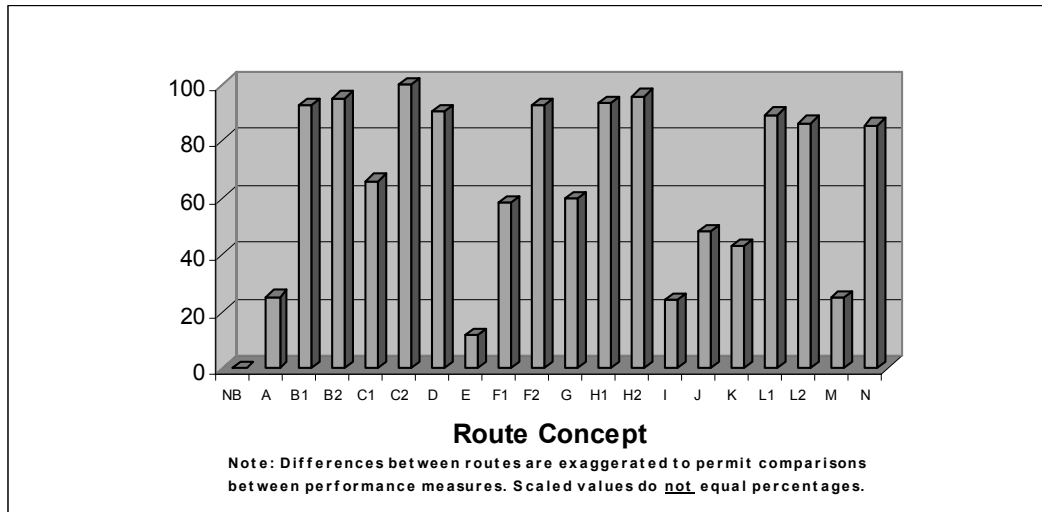
Table A15 - Average Scaled Percentages of VMT and VHT on Major Highways in Study Area

Alternative	Average Scaled Percentage, VMT & VHT on Highways	Ranking
NB	0.00	20
A	24.22	19
B1	95.38	4
B2	100.00	1
C1	62.45	11
C2	86.89	10
D	95.31	5
E	28.76	17
F1	59.18	12
F2	94.26	8
G	58.46	13
H1	95.04	7
H2	98.30	2
I	25.32	18
J	44.95	15
K	57.55	14
L1	92.91	9
L2	95.30	6
M	31.18	16
N	95.72	3

Figure A15 - Average Scaled Percentages of VMT and VHT on Major Highways in Study Area

Note: Differences between routes are exagerrated to permit comparisons between performance measures. Scaled values do <u>not</u> equal percentages.
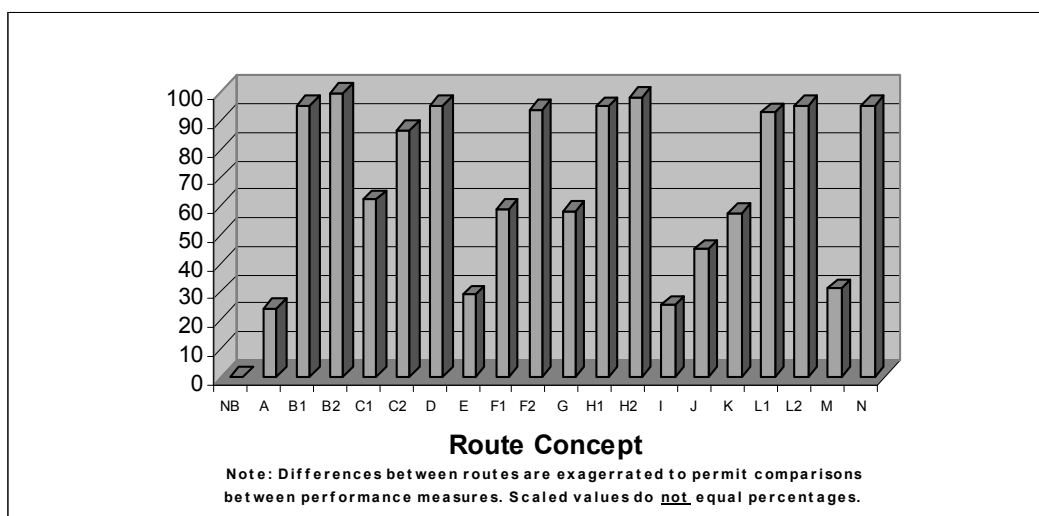
Figure and Table A16 show the Average Scaled Scores for all Personal Accessibility measures. The scores were computed by taking the arithmetic average of the scaled scores for the three major categories (accessibility, proximity, and use of major highways), and then scaling them on a 0 to 100 scale. Note that Table A16 is printed on the following page in landscape format.

Figure A16 - Average Scaled Scores, All Personal Accessibility Measures
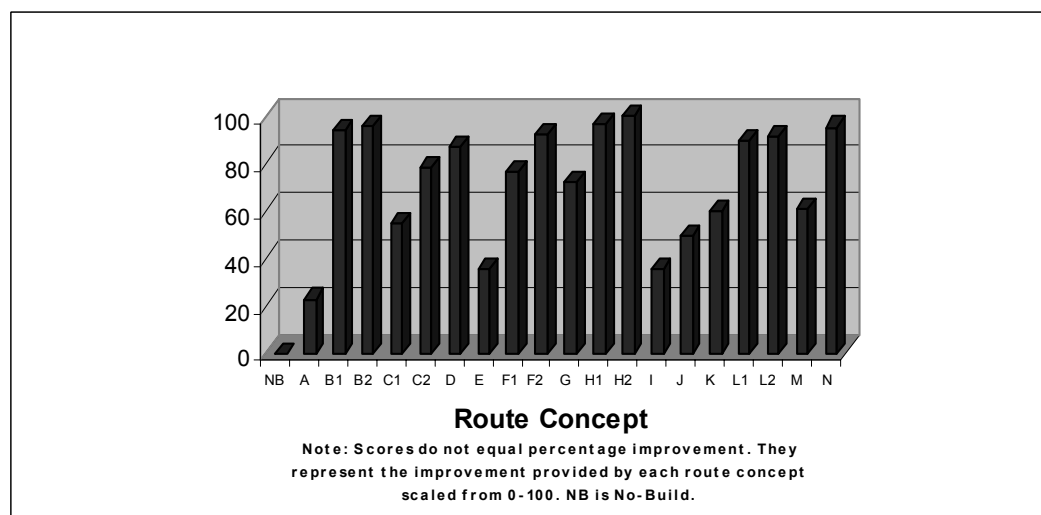

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route concept scaled from 0-100. NB is No-Build.

Table A16 - Average Scaled Scores, All Personal Accessibility Measures

Alternative	Hwy Usage			Accessibility						Proximity				Fam. 2 Comp.	
	% VMT	% VHT	Comp. Score	Pop.	Emp.	Pop. Wgt. Emp.	Comp. Score	Edu.	Urban Area	To Indianapolis			Comp. Score	Score	Rank
										1 Hr.	2 Hr.	3 Hr.			
NB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20
A	21.89	25.13	24.22	26.16	25.61	23.58	25.12	0.00	20.92	0.00	28.72	25.22	17.88	22.88	19
B1	92.62	92.57	95.38	89.44	89.23	85.23	87.97	91.85	78.78	100.00	68.83	53.03	93.77	94.33	5
B2	99.06	95.10	100.00	92.95	92.90	93.73	93.19	76.24	78.78	100.00	65.67	53.03	89.28	96.15	3
C1	55.25	66.00	62.45	66.90	66.53	62.71	65.38	14.21	10.23	13.47	54.21	43.03	32.29	54.50	15
C2	68.69	100.00	86.89	82.61	82.04	82.42	82.36	59.57	31.45	61.80	68.51	36.49	61.59	78.57	10
D	94.56	90.49	95.31	75.51	75.42	80.49	77.14	80.77	100.00	100.00	56.70	12.13	83.52	87.13	9
E	44.20	11.65	28.76	52.63	52.55	42.17	49.12	14.21	10.23	13.47	46.48	29.48	27.20	35.77	17
F1	56.55	58.36	59.18	93.50	93.63	87.94	91.69	61.92	12.07	42.07	100.00	100.00	75.51	77.05	11
F2	90.48	92.54	94.26	100.00	100.00	100.00	100.00	70.25	12.07	76.94	75.11	93.46	78.32	92.78	6
G	53.75	59.75	58.46	83.24	83.60	75.63	80.82	61.92	12.07	42.07	100.00	86.45	72.27	72.01	12
H1	91.03	93.49	95.04	94.33	94.17	93.06	93.85	91.85	68.55	100.00	68.83	71.72	95.79	96.90	2
H2	95.07	95.78	98.30	97.45	96.94	99.72	98.04	80.77	89.77	100.00	65.67	71.72	97.45	100.00	1
I	25.09	24.08	25.32	58.62	57.44	50.39	55.49	0.00	0.00	0.00	51.90	48.18	23.91	35.64	18
J	38.98	48.29	44.95	72.65	71.56	64.95	69.72	14.21	0.00	13.47	51.90	48.18	30.52	49.42	16
K	68.64	43.09	57.55	91.85	87.72	98.33	92.63	9.01	26.44	14.31	29.71	29.48	26.03	59.98	14
L1	90.92	89.47	92.91	83.69	83.53	84.33	83.85	94.73	68.55	100.00	38.79	64.71	87.63	89.99	8
L2	98.64	86.39	95.30	86.00	85.97	90.66	87.54	83.65	89.77	100.00	38.79	53.03	87.26	91.93	7
M	35.66	24.88	31.18	65.91	65.09	50.42	60.47	94.73	68.55	100.00	38.79	64.71	87.63	61.02	13
N	100.00	85.85	95.72	84.29	83.65	86.65	84.87	100.00	94.87	100.00	61.42	62.28	100.00	95.51	4

3.   Traffic Congestion

The Purpose and Need Statement did not find that traffic congestion is or would be a pervasive problem throughout the study area. However, there are localized problem spots near developed areas for which the highway may be an opportunity to reduce forecasted congestion. Accordingly, reducing congestion is a goal of I-69, although not a core goal.

Several measures of performance for congestion relief were computed. All computations were made using the Indiana Statewide Travel Model for the Year 2025. All measures of congestion were for average conditions in the study area only, over a 24 hour period, weighted by each hour's VMT. Tables and Figures A17 through A22 show the results of applying each indicator to each alternative. Table and Figure A23 show the normalized scores for all congestion measures. These measures included:

- *Volume to Capacity (v/c) Ratio on Major Highways in Study Area, Weighted by VMT.* Major highways are defined as Interstates and other Principal Arterials. Volume to capacity ratio is a measure of a road's usage to its capacity. For a detailed description of v/c ratio, see *Task Report 3.2, Project Issues and Performance Factors, pp. 16 - 17.*

- *Percentage of Congested Roadway Lane Miles in Study Area.* This was computed for all roadways in the study area. A roadway was considered "congested" if its v/c ratio was over 0.75, using Level of Service C as the definition of capacity.

- *Percentage of Congested VMT in Study Area.* "Congested VMT" was defined as VMT experiencing a v/c ratio of at least 0.75, using Level of Service C as the definition of capacity.

- *Percentage of Congested VHT in Study Area.* "Congested VHT" was defined as VHT experiencing a v/c ratio of at least 0.75, using Level of Service C as the definition of capacity.

- *Percentage of VHT Operated in Delayed Conditions in Study Area.* This is the difference of total VHT minus free flow VHT, divided by total VHT. This is a measure of the percentage of "excess" VHT drivern due to traffic congestion.

- *Efficient System Performance Index by VHT for Study Area.* This is a normalized index in which VHT operated at v/c ratios between 0.75 and 1.00 is counted once, and VHT operated at a v/c ratio over 1.00 is counted twice. For a detailed description of this Index, see *Task Report 3.2.1, Transportation Performance Factors, pp. 22 - 23.*

**Table A17 - Volume to Capacity (v/c) Ratio on
Major Highways in Study Area, Weighted by VMT**

Alternative	Scaled Percentage, VMT on Highways	% VMT on Highways	Ranking
NB	0.00	60.48%	20
A	21.89	61.44%	19
B1	92.62	64.55%	6
B2	99.06	64.84%	2
C1	55.25	62.91%	13
C2	68.69	63.50%	10
D	94.56	64.64%	5
E	44.20	62.42%	15
F1	56.55	62.97%	12
F2	90.48	64.46%	9
G	53.75	62.84%	14
H1	91.03	64.48%	7
H2	95.07	64.66%	4
I	25.09	61.58%	18
J	38.98	62.19%	16
K	68.64	63.50%	11
L1	90.92	64.48%	8
L2	98.64	64.82%	3
M	35.66	62.05%	17
N	100.00	64.88%	1

Figure A17 - Scaled v/c Ratios on Major Highways in Study Area, Weighted by VMT

Route Concepts

Note: Differences between routs are exaggerated to permit comparisons between performance measures. Scaled values do not equal perccentages.
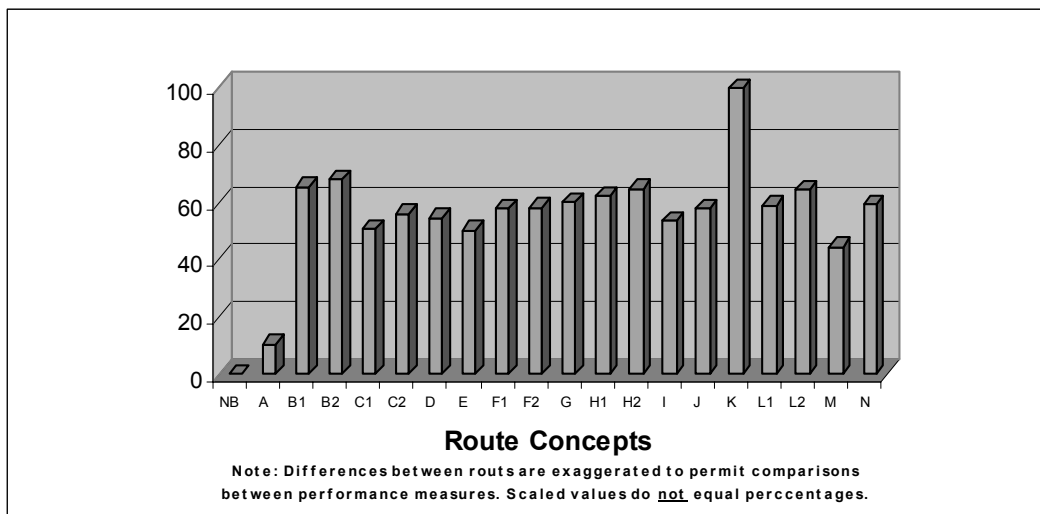
Table A18 - Percentage of Congested Roadway Lane Miles in Study Area

Alternative	Scaled Percentage of Congested Lane-Miles	% Lane-Miles V/C > .75	Ranking
NB	0.00	16.86%	20
A	21.76	16.44%	19
B1	91.19	15.10%	2
B2	100.00	14.93%	1
C1	53.89	15.82%	15
C2	69.95	15.51%	8
D	78.76	15.34%	6
E	33.68	16.21%	18
F1	52.85	15.84%	16
F2	88.60	15.15%	3
G	56.99	15.76%	14
H1	64.77	15.61%	12
H2	86.01	15.20%	5
I	67.36	15.56%	11
J	60.10	15.70%	13
K	76.68	15.38%	7
L1	68.91	15.53%	9
L2	87.05	15.18%	4
M	46.11	15.97%	17
N	67.88	15.55%	10

Figure A18 - Scaled Percentages of Congested Roadway Lane Miles in Study Area

Note: Differences between routes are exaggerated to permit comparisons between performance measures. Scaled values do not equal percentages.

Table A19 - Percentage of Congested VMT in Study Area

Alternative	Scaled Percentage of Congested VMT (>.75)	% Congested VMT (>.75)	Ranking
NB	0.00	49.95%	20
A	37.07	48.70%	18
B1	88.88	46.95%	4
B2	100.00	46.58%	1
C1	63.23	47.82%	13
C2	67.05	47.69%	11
D	82.50	47.17%	8
E	29.66	48.95%	19
F1	63.40	47.81%	12
F2	87.13	47.01%	5
G	61.12	47.89%	14
H1	48.64	48.31%	17
H2	83.16	47.15%	7
I	86.71	47.03%	6
J	55.99	48.06%	15
K	98.52	46.63%	2
L1	54.66	48.11%	16
L2	95.64	46.73%	3
M	74.73	47.43%	10
N	76.13	47.38%	9

Figure A19 - Scaled Percentages of Congested VMT in Study Area

Route Concept

Note: Scores represent the improvement provided by the alternatives in 2025 scaled to a range of 0 to 100. "NB" is the No-Build alternative.
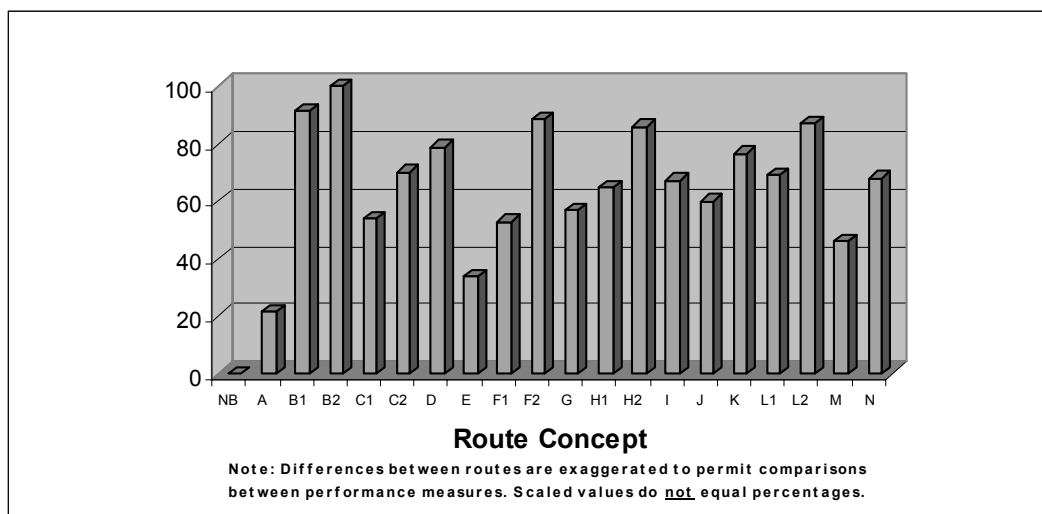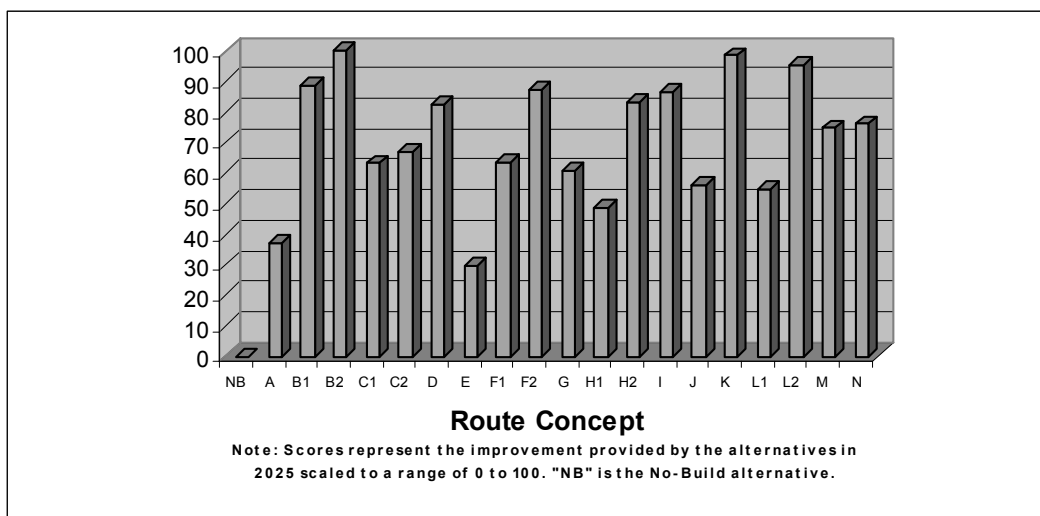
Table A20 - Percentage of Congested VHT in Study Area

Alternative	Scaled Percentage of Congested VHT (>.75)	% Congested VHT (>.75)	Ranking
NB	6.87	68.88%	19
A	16.90	68.63%	18
B1	70.12	67.29%	5
B2	79.22	67.07%	2
C1	41.03	68.02%	17
C2	46.66	67.88%	12
D	60.65	67.53%	8
E	0.00	69.05%	20
F1	49.42	67.81%	11
F2	77.03	67.12%	3
G	46.26	67.89%	13
H1	41.47	68.01%	16
H2	66.80	67.38%	6
I	61.13	67.52%	7
J	42.75	67.98%	14
K	100.00	66.55%	1
L1	42.19	67.99%	15
L2	71.43	67.26%	4
M	53.74	67.70%	10
N	57.13	67.62%	9

Figure A20 - Scaled Percentages of Congested VHT in Study Area

Note: Scores represent the improvement provided by the alternatives in 2025 scaled to a range of 0 to 100. "NB" is the No-Build alternative.
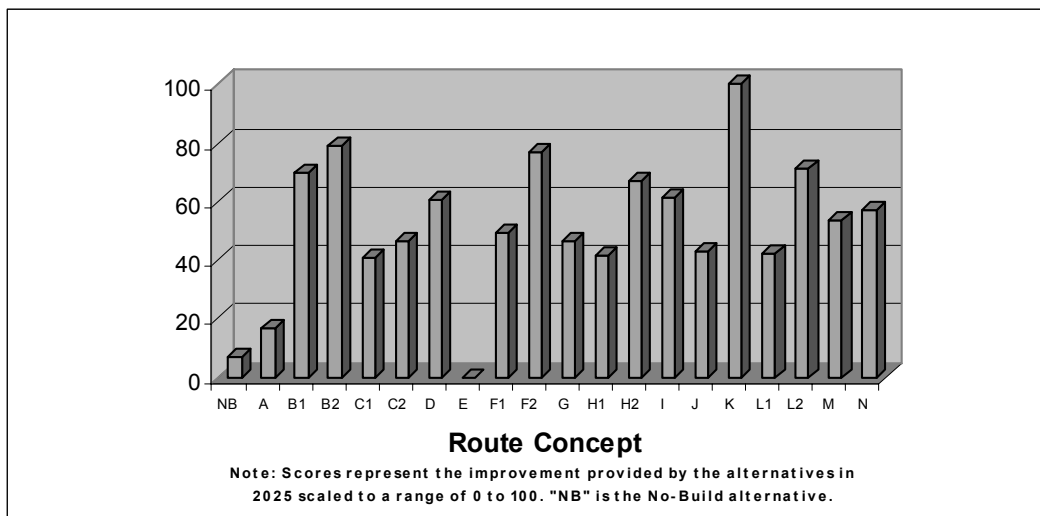
Table A21 - Percentage of VHT Operated in Delayed Conditions in Study Area

Alternative	Scaled Percentage of VHT that Experiences Delay	% Delayed VHT	Ranking
NB	48.41	31.43%	16
A	30.81	31.83%	19
B1	48.50	31.43%	15
B2	63.67	31.09%	5
C1	43.71	31.54%	18
C2	55.58	31.27%	9
D	59.91	31.17%	7
E	0.00	32.53%	20
F1	54.95	31.29%	10
F2	71.37	30.91%	2
G	52.26	31.35%	11
H1	51.59	31.36%	12
H2	64.03	31.08%	4
I	50.63	31.38%	13
J	47.57	31.45%	17
K	100.00	30.26%	1
L1	49.61	31.41%	14
L2	61.48	31.14%	6
M	57.09	31.24%	8
N	67.58	31.00%	3

Figure A21 - Scaled Percentages of VHT Operated in Delayed Conditions in Study Area

Note: Scores represet the improvements provided by the alternatives in 2025 scaled to a range of 0 to 100. "NB" is the No-Build alternative.
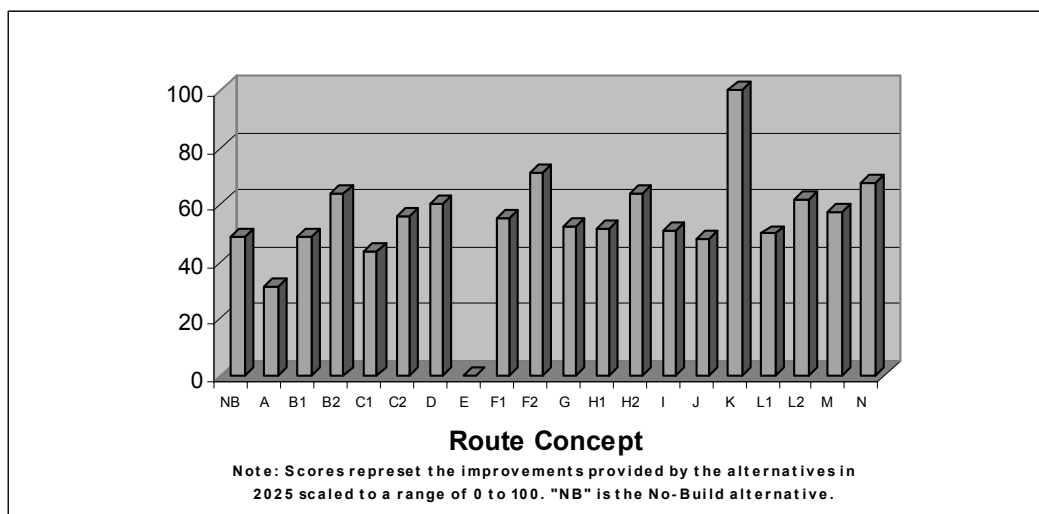
Table A22 - Efficient System Performance Index by VHT for Study Area

Alternative	Scaled Efficient System Performance Index	ESPI	Ranking
NB	19.60	7.884	18
A	16.14	7.872	19
B1	51.30	7.994	6
B2	55.62	8.009	4
C1	31.41	7.925	17
C2	40.06	7.955	11
D	46.97	7.979	7
E	0.00	7.816	20
F1	42.07	7.962	8
F2	58.21	8.018	2
G	37.18	7.945	14
H1	40.06	7.955	11
H2	53.60	8.002	5
I	41.50	7.96	9
J	35.73	7.94	15
K	100.00	8.163	1
L1	38.62	7.95	13
L2	57.06	8.014	3
M	35.16	7.938	16
N	41.50	7.96	9

Figure A22 - Scaled Efficient System Performance Indices by VHT for Study Area

Note: Scores represent the improvemet provided by the alternatives in 2025 scaled to a range of 0 to 100. "NB" is the No_build alternative.
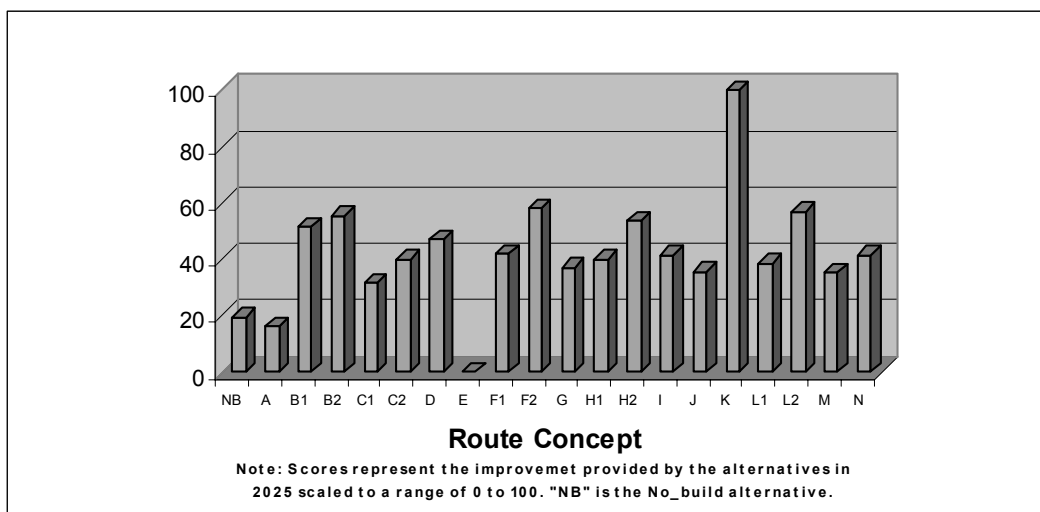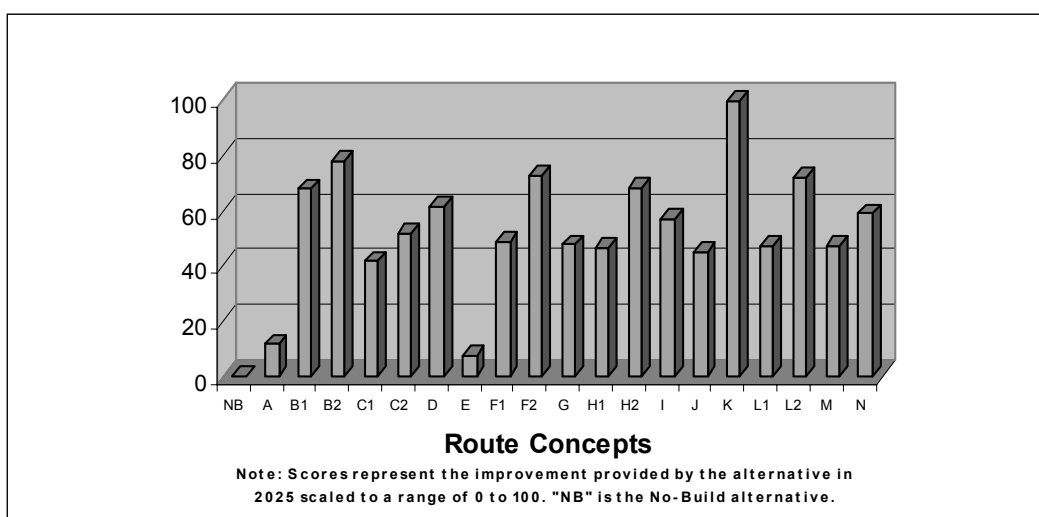
Table and Figure A23 show the Average Scaled Scores for all Congestion measures. The scores were computed by taking the arithmetic average of the scaled scores for the six congestion measures, and then scaling them on a 0 to 100 scale.

Table A23 - Average Scaled Scores, All Congestion Measures

Alternative	Composite Scaled Congestion Performance Measures	Ranking
NB	0.00	20
A	11.63	18
B1	68.09	6
B2	78.28	2
C1	41.79	17
C2	52.10	10
D	61.67	7
E	7.76	19
F1	49.13	11
F2	73.14	3
G	47.76	12
H1	46.79	15
H2	68.69	5
I	57.14	9
J	45.01	16
K	100.00	1
L1	47.58	13
L2	72.38	4
M	47.27	14
N	58.94	8

Figure A23 - Average Scaled Scores, All Congestion Measures

Route Concepts

Note: Scores represent the improvement provided by the alternative in 2025 scaled to a range of 0 to 100. "NB" is the No-Build alternative.

4. Traffic Safety

The Purpose and Need Statement demonstrated that there are areas of rural Southwest Indiana that experience significantly higher crash rates than rural Indiana as a whole. Accordingly, the improvement of traffic safety was adopted as a goal of I-69. While traffic safety is understood to be a legitimate need, it is not deemed to be of a magnitude to warrant designation as a core objective.

The NET_BC post-processor forecasts annual reductions in accidents for each alternative. This forecast is based upon the Year 2025 assigned network for each alternative. Forecasts are made separately for fatal accidents, injury accidents, and property damage only accidents.

Table A24 gives the Year 2025 forecasted reduction in all types of accidents for each alternative. Tables and Figures A25 through A27 show the scaled performance of each alternative for each type of accident. Table and Figure A28 give the composite scaled performance of each alternative using all three accident measures.

Table A24 - Year 2025 Forecasted Reduction in Accidents

Alternative	Accident Type			
	Fatal	Injury	PDO	Total
NB	0	0	0	0
A	7	702	490	1,199
B1	7	949	851	1,807
B2	11	1,200	1,220	2,431
C1	8	699	543	1,250
C2	9	1,131	1,173	2,313
D	10	1,318	1,267	2,595
E	6	598	361	965
F1	7	647	520	1,174
F2	10	1,191	1,167	2,368
G	7	641	538	1,186
H1	7	968	875	1,850
H2	10	1,241	1,239	2,490
I	5	508	374	887
J	5	548	435	988
K	5	750	717	1,472
L1	10	1,098	962	2,070
L2	10	1,300	1,224	2,534
M	5	560	423	988
N	10	1,330	1,254	2,594

Table A25 - Scaled Performance of Alternatives in Reducing Year 2025 Fatal Accidents

Alternative	Scores	Rank
NB	0	20
A	64	10
B1	64	10
B2	100	1
C1	73	9
C2	82	8
D	91	2
E	55	15
F1	64	10
F2	91	2
G	64	10
H1	64	10
H2	91	2
I	45	16
J	45	16
K	45	16
L1	91	2
L2	91	2
M	45	16
N	91	2

Figure A25 - Scaled Performance of Alternatives in Reducing Year 2025 Fatal Accidents

Route Concepts

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route scaled from 0-100. NB is No-Build.
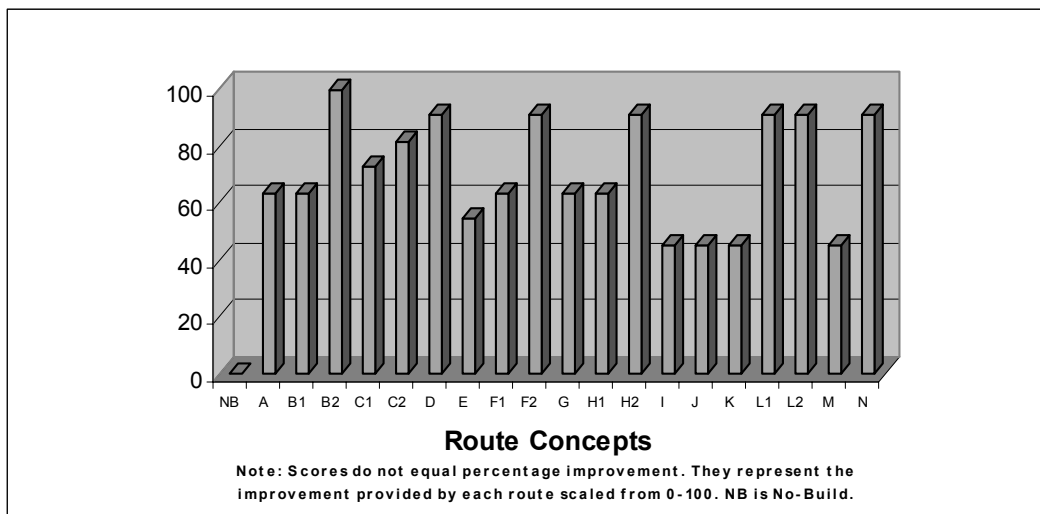
Table A26 - Scaled Performance of Alternatives in Reducing Year 2025 Injury Accidents

Alternative	Scores	Rank
NB	0	20
A	53	12
B1	71	10
B2	90	5
C1	53	13
C2	85	7
D	99	2
E	45	16
F1	49	14
F2	90	6
G	48	15
H1	73	9
H2	93	4
I	38	19
J	41	18
K	56	11
L1	83	8
L2	98	3
M	42	17
N	100	1

Figure A26 - Scaled Performance of Alternatives in Reducing Year 2025 Injury Accidents

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route scaled from 0-100. NB is No-Build.
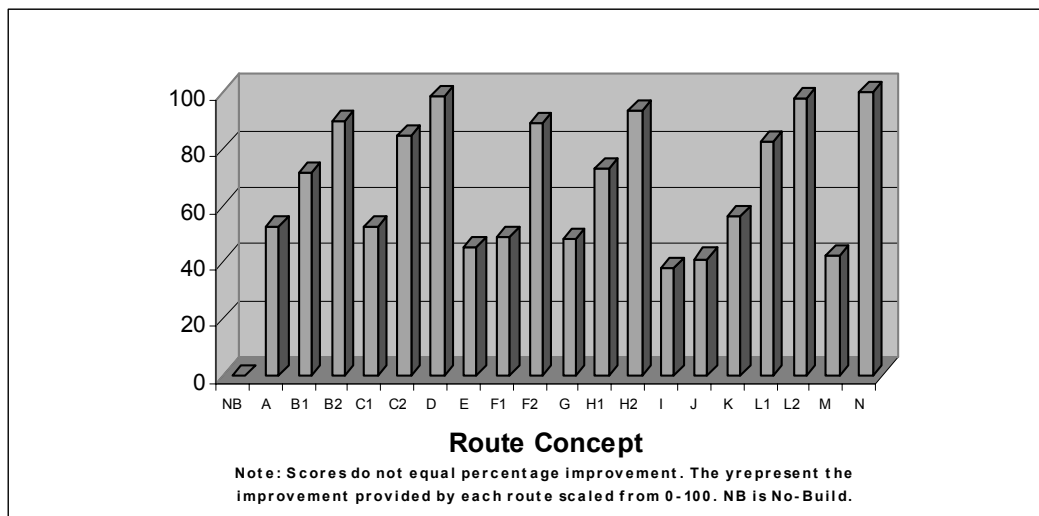
**Table A27 - Scaled Performance of Alternatives in Reducing
Year 2025 Property Damage Only Accidents.**

Alternative	Scores	Rank
NB	0	20
A	39	15
B1	67	10
B2	96	5
C1	43	12
C2	93	6
D	100	1
E	28	19
F1	41	14
F2	92	7
G	42	13
H1	69	9
H2	98	3
I	30	18
J	34	16
K	57	11
L1	76	8
L2	97	4
M	33	17
N	99	2

**Figure A27 - Scaled Performance of Alternatives in Reducing
Year 2025 Property Damage Only Accidents**

Route Concept

Note: Scores do not equal percentage improvement. They represent the
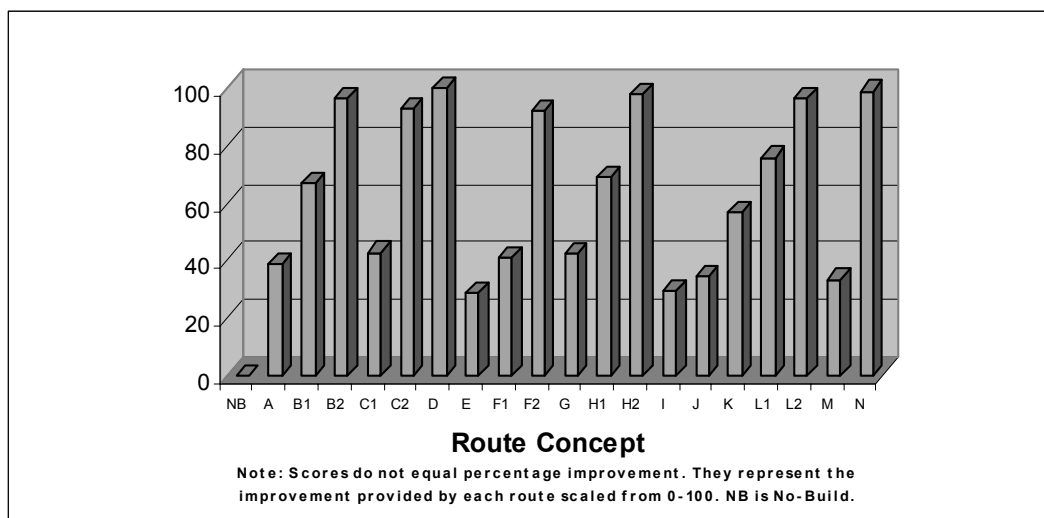improvement provided by each route scaled from 0-100. NB is No-Build.

Table and Figure A28 show the Average Scaled Scores for all Congestion measures. The scores were computed by taking the arithmetic average of the scaled scores for the three safety measures, and then scaling them on a 0 to 100 scale.

Table A28 - Average Scaled Scores, All Safety Measures

Alternative	Crash Reduction Composite Scores	Rank
NB	0.00	20
A	53.48	13
B1	69.71	10
B2	98.80	3
C1	57.98	11
C2	89.46	7
D	100.00	1
E	44.14	16
F1	52.87	15
F2	93.99	6
G	53.20	14
H1	70.85	9
H2	97.24	5
I	39.02	19
J	41.72	17
K	54.63	12
L1	86.00	8
L2	98.36	4
M	41.70	18
N	99.96	2

Figure A28 - Average Scaled Scores, All Safety Measures

Note: Scores do not equal percentage improvement. They represent the improvement provided by each route scaled from 0-100. NB is No-Build.